

In the Drawings:

Please add to the application, the enclosed single New Sheet of drawing bearing a new Fig. 3. As required by the Examiner, the proposed Fig. 3 submitted on November 24, 2008 has been revised to avoid expressly showing the control device being contained within the vehicle. In conformance with the written disclosure, new Fig. 3 does not specify whether the control device is inside or outside of the vehicle. See the specification at page 6 lines 6 to 15 and 34, page 8 lines 35 and 36, and original claims 5 and 11. Approval and entry of the New Sheet bearing new Fig. 3 are respectfully requested.

[RESPONSE CONTINUES ON NEXT PAGE]

REMARKS:

- 1) In view of the accompanying Request for Continued Examination (RCE), the Final Status of the Office Action of March 12, 2009 shall be withdrawn, and the Examination shall be continued on the basis of the present amendments and remarks.
- 2) The drawings have been amended as set forth above in the drawing amendment section. In conformance with the written disclosure, new Fig. 3 does not include any new matter because it does not specify whether the control device is inside or outside of the vehicle. See the specification at page 6 lines 6 to 15 and 34, page 8 lines 35 and 36, and original claims 5 and 11. Approval and entry of the enclosed New Sheet bearing new drawing Fig. 3 are respectfully requested.
- 3) The specification has been amended to avoid or omit some asserted new matter that was allegedly introduced by the prior amendment of November 24, 2008. The particular amendments and the original disclosure basis thereof will be discussed below with regard to the particular new matter objections. Entry of the amendments is respectfully requested.
- 4) The claims have been amended as follows.

Independent claim 21 has been amended to delete the word "linear", and the feature that the motor revolution speed and the vehicle velocity "are not directly proportional to one another". Instead, claim 21 has been amended to recite that the motor

revolution speed is increasable in plural discontinuous speed range shifting steps with motor revolution speed jumps therebetween. In a plurality of such shifting steps, the motor revolution speed is increasable with a virtual transmission ratio in which the motor revolution speed and the vehicle velocity vary along a characteristic line that does not pass through a zero point of the motor revolution speed and the vehicle velocity. These features are supported in the original disclosure.

Specification page 2 line 30 to page 3 line 7 (and page 3 line 34 to page 4 line 20, and page 8 line 1 to page 9 line 16) explain that the inventive gearbox causes a revolution speed change in shifting steps with revolution speed jumps or leaps therebetween, with the apparent operation like a conventional stepped transmission. Specification page 4 lines 22 to 25 and original claim 5 recite that the regulating step for the increase or the reduction of the revolution speed may be defined as a "characteristic line". This is also shown in Fig. 2. Furthermore, the original specification at page 8 line 36 to page 9 line 4 recites that the transmission ratio may be a "virtual" transmission ratio, of which the extension does not pass through the zero point of the revolution speed-velocity diagram. Such diagrams are shown in Figs. 1 and 2. The specification at page 6 line 29 makes clear that the "velocity" labeled as "v" in the diagrams is the "driving speed" of the motor vehicle. The fact that the pertinent "revolution speed" labeled as "n" on the diagram is the motor revolution speed, is clearly understood from the specification at page 2 lines 6 to 16 referring to "the speed of the driving motor ... is continuously increased in

infinitely-variable manner" (underlining added). Also, a person of ordinary skill in the art would readily understand that the "revolution speed" is the driving motor revolution speed upon reading the specification at page 2 line 30 to page 3 line 4, page 4 lines 10 to 18, page 6 lines 28 to 31, etc., as further supported by the known prior art, such as the article referenced in the specification at page 1 lines 34 to lines 36, as well as US Patent 5,947,861 (Nobumoto) and US Patent 4,704,683 (Osanai) as cited and applied by the Examiner. For example, the diagrams in Figs. 5, 6, 7 and 8 of Nobumoto also show the engine speed (N) on the vertical axis and the vehicle speed (V) on the horizontal axis. Similarly, the gear ratio diagrams shown in present Figs. 1 and 2 follow the standard convention that is well-known by persons of ordinary skill in the art, by identifying the engine rotation or revolution speed (n) along the vertical axis and the vehicle driving speed (v) along the horizontal axis as also stated in the specification at page 6 lines 29 to 31. Thus, it can be clearly understood that the original disclosure of this application is talking about a motor revolution speed and a vehicle driving velocity. An amendment that merely recites a feature that was clearly inherently included (yet not expressly stated) in the original disclosure does not introduce any new matter.

Claim 29 has been amended to clarify the "manner in which the motor vehicle is driven", namely that the change in the acceleration mode can be activated dependent on a position of an accelerator peddle of the motor vehicle or dependent on the

vehicle velocity or dependent on an acceleration of the motor vehicle. These clarifications are supported in the specification at page 5 lines 33 to 36 and also in claim 23, which has further support in page 4 lines 22 to 28, original claim 13, and Fig. 2.

Claim 32 has been amended to avoid or omit alleged new matter and instead to recite that the transmission ratio is adjusted in plural discrete discontinuous steps with discontinuous jumps of the motor rotational speed between the successive transmission ratio ranges, which respectively have a virtual transmission ratio of the motor rotational speed relative to the vehicle speed, in which the motor rotational speed and the vehicle speed vary along a characteristic line that does not pass through a zero point of the motor rotational speed and the vehicle speed. This amendment of claim 32 is supported by the same original disclosures and the same ordinary knowledge of a person of skill in the art as discussed above in connection with the amendment of claim 21. For example, see the specification at page 2 line 30 to page 3 line 7, page 3 line 34 to page 4 line 25, and page 8 line 1 to page 9 line 16, and original claim 5.

Claim 33 has been amended to avoid or omit alleged new matter, and instead to recite that the characteristic line of the virtual transmission ratio is defined mathematically by the commonly known linear equation definition of a "line", with the equation format  $y = mx + b$ , specifically  $n = mv + b$ . This amendment is supported by the commonly known linear equation defining a line, as well as Fig. 2 in connection with the specification at page 8 line 36 to page 9 line 4.

Claim 34 has been amended to avoid or omit alleged new matter, and instead recite that the successive transmission ratio ranges include at least one virtual transmission ratio in which the motor rotational speed and the vehicle speed vary along a characteristic line defined as  $n = mv + b$ . This amendment of claim 34 is supported by the original disclosure as discussed above for the amendment of claims 32 and 33.

For the above reasons, all of the present claim amendments are supported by the original disclosure and do not introduce any new matter. Entry and consideration of the claim amendments are respectfully requested.

- 5) Referring to the third paragraph on page 2 of the Office Action, the objection to the drawing (Fig. 3) submitted on November 24, 2008 has been addressed in the present amendment of the drawings. Please see the enclosed Drawing Transmittal accompanied by a further revised proposal of a new Fig. 3. The new Fig. 3 does not specify whether the control device is inside or outside of the vehicle, in conformance with the written disclosure (see specification page 6 lines 6 to 15 and 34, page 8 lines 35 and 36, and original claims 5 and 11). Fig. 3 merely schematically shows the subject matter that was originally disclosed in the written description, so that the new Fig. 3 does not introduce any new matter. Nonetheless, a person of ordinary skill in the art readily understands that a controller for the automatic transmission of a motor vehicle is typically included in the vehicle. Please withdraw the objection to the drawings.

- 6) Referring to the paragraph bridging pages 2 and 3 of the Office Action, the objection to the abstract of the disclosure for allegedly introducing new matter is respectfully traversed.

The Examiner has asserted that the amendment changing "revolution speed" to --motor revolution speed-- introduces new matter. This assertion is respectfully traversed, because it does not involve new matter to merely expressly state a feature that was inherently disclosed and understood from the context of the original written description. For example, the specification at page 2 lines 6 to 16 expressly states that it is "the speed of the driving motor" that is increased in an infinitely-variable manner. Also, a person of ordinary skill in the art would clearly understand that the pertinent "revolution speed" is the motor revolution speed by reading the specification at page 2 line 30 to page 3 line 4, page 4 lines 10 to 18, and page 6 lines 28 to 31, especially also in connection with Figs. 1 and 2 of the present application as described at page 6 lines 21 to 32.

As can be seen similarly in Figs. 5, 6, 7 and 8 of US Patent 5,947,861 (Nobumoto), a person of ordinary skill in the art readily understands that such a gear ratio map or diagram involves the engine or motor revolution speed (n) charted on the vertical axis, and the vehicle driving speed (v) charted on the horizontal axis. Thus, a person of ordinary skill in the art even looking at Figs. 1 and 2 of the present application would immediately understand that the pertinent revolution speed (n) on the vertical axis is the motor revolution speed of the driving motor of the vehicle.

Thus, expressly stating that it is the motor revolution speed does not introduce any new matter, because that fact was inherently understood from the original disclosure. The Examiner is respectfully requested to withdraw the objection to the abstract of the disclosure.

- 7) Referring to pages 3 and 4 of the Office Action, the objection to the amendment in the prior Response of November 24, 2008 for allegedly introducing new matter into the disclosure has been addressed in the present amendment, and is respectfully traversed.

Regarding page 5 lines 8 and 9 of the prior Response, the word "only" has been changed back to the original word --merely-- at page 5 line 20 of the specification, to avoid any question or issue of alleged new matter.

Regarding page 5 lines 23 and 24 of the prior Response, the prior amended text "the driver's desire or intention for sporty driving" has been changed to --sporty driving--, as merely an editorial improvement of the original translated term "sportive driving" at page 5 line 33 of the specification, to avoid any question or issue of alleged new matter.

Regarding page 6 line 4 of the prior Response, the previously submitted amendment was a correction and improvement of the translation of the corresponding foreign language PCT application text. Nonetheless, to avoid any question or issue of alleged new matter, the phrase "driver's intention for a power-oriented" has simply been deleted. The remaining amendment changes the original phrase "an efficiency-oriented, sportive



driving" to --a sporty driving--. It is clearly understood by persons of ordinary skill, that a sporty or sportive driving characteristic is not "efficiency oriented" as originally erroneously translated. For example, see the specification at page 1 lines 15 to 19.

Regarding page 6 lines 9 to 12 of the prior Response, the reference to retro-fitting or after-equipping the automatic gearbox has been omitted to avoid any question or issue of alleged new matter.

Regarding page 6 lines 11 and 12 of the prior Response, the previous submitted amendment has been reversed by instead again introducing the original language. There is no intended change of meaning, but rather this amendment simply avoids any question or issue of alleged new matter.

Regarding page 6 line 16 of the prior Response, the term "newest state" has been changed to --updated state-- in view of the clear disclosure that the software is updated to an updated state, so that the present amendment avoids any question or issue of alleged new matter.

The Examiner's allegation of new matter in all previous amendments that replaced "revolution speed" with --engine or motor revolution speed-- (e.g. referring to page 8 lines 1 and 2 of the prior Response), is respectfully traversed. As discussed above, the original disclosure of this application clearly refers to "the speed of the driving motor" (page 2 line 14) as being the pertinent "revolution speed", and this is also clearly understood by a person of ordinary skill looking at present Figs. 1 and 2. For example, a person of ordinary skill

in the art familiar with the Nobumoto reference (as discussed above) knows that the present Figs. 1 and 2 represent the engine or motor revolution speed (n) on the vertical axis and the vehicle driving speed (v) on the horizontal axis. A patent specification need only be written with enough disclosure for proper comprehension by a person of ordinary skill, and therefore the disclosure does not need to expressly state features that are clearly evident and understood by persons of ordinary skill. Furthermore, adding an express statement of such an inherent feature of the originally disclosed invention does not introduce any new matter. Therefore, amending the disclosure to state that which was clearly inherently understandable, namely that the "revolution speed" is a --driving motor or engine revolution speed--, does not introduce any new matter.

Regarding page 8 line 11 of the prior Response, the previous amendment has been reversed back to the original language to avoid any question or issue of alleged new matter.

Regarding page 8 line 14 of the prior Response, the previously added phrase "or power" has been deleted to avoid any question or issue of alleged new matter.

Regarding page 12 lines 2 and 3 of the prior Response, the new phrases "linear transmission" and "linear" added in the prior Response have now been deleted to avoid any question or issue of alleged new matter. Instead, it has been stated that the originally disclosed virtual transmission ratio extends along "a characteristic line" as disclosed in the original specification at page 4 line 25 and original claim 5. This is also supported by Fig. 2. Also see the above discussion of this feature.

The previously added text at page 12 lines 5 to 16 of the prior Response has been amended to avoid any question or issue of alleged new matter. The amended text does not rely merely on Fig. 2 to provide support for a linear characteristic. Instead, as discussed above, the original written description at page 4 line 25 clearly discloses that the transmission ratio can be defined by a "characteristic line". Also, the original written description clearly discloses that the extension of such a virtual transmission ratio along a characteristic line "does not pass through the zero point of the revolution speed-velocity diagram" (page 9 lines 1 to 4). A person of ordinary skill in the art is readily familiar with the typical format of a linear equation defining a line that does not pass through the zero point of a diagram of the two variables, for example the linear equation format  $y = mx + b$  for the variables  $x$  and  $y$ . Thus, in the present context in which the variables are the revolution speed ( $n$ ) and the vehicle driving speed ( $v$ ), the typical linear equation is expressed as  $n = mv + b$ , wherein  $n$  is the revolution speed,  $v$  is the driving speed,  $m$  is the slope of the characteristic line, and  $b$  is the non-zero offset of the vertically-charted variable ( $n$ ) from zero, for the characteristic line, when the horizontally-charted variable ( $v$ ) is zero. Making these statements in the specification, of something that is well known and well understood by a person of ordinary skill in the art, does not introduce any new matter, but merely provides a mathematical description of the originally verbally disclosed inventive feature. Recasting the originally disclosed invention

in different terms that describe or define the same exact inventive feature, does not introduce any new matter.

Regarding page 12 lines 19 and 20 of the prior Response, the previous text "falling below the minimal speed" was corrected to "--exceeding the maximum revolution speed--", in conformance with the original disclosure. For example, page 5 lines 8 to 14 and original claim 8 clearly describe that the step-wise change of the revolution speed can be triggered when falling below a minimum revolution speed or exceeding a maximum revolution speed. The text in the specification at page 9 lines 6 to 8 refers to triggering the revolution speed leap 14, corresponding to a "down shift" to a lower gear (with a higher engine revolution speed for the same vehicle driving speed), as shown in Fig. 2. This revolution speed leap 14 clearly follows after the transmission ratio characteristic line 13, when the engine revolution speed has reached the maximum limit for the line segment 13. In other words, the line segment 14 joins the "top end" of the line segment 13. So, if there is a call for more power when the transmission is at the "top end" of the engine rotational speed range of the virtual gear ratio 13, then the transmission will "downshift" to a lower gear 15 through the speed leap 14, so that the engine reaches a higher engine revolution speed range. Thus, the corrected description text now corresponds what is clearly shown in Fig. 2 as understood by a person of ordinary skill in the art.

Regarding page 12 line 27 of the prior Response, the previously added phrase "driving" has simply been deleted as

unnecessary for a proper clear understanding of the disclosure, in order to avoid any question or issue of alleged new matter.

For the above reasons, it is respectfully submitted that the amendments of the disclosure do not introduce any new matter, and the Examiner is respectfully requested to withdraw the new matter objection.

- 8) Referring to page 5 of the Office Action, the rejection of claims 21 to 34 as failing to comply with the written description requirement under 35 USC 112(1) is respectfully traversed.

The subject matter of the claims is described in the specification in such a way as to reasonably convey to a person of ordinary skill in the art that the inventors had possession, at the time the application was filed, of the presently claimed invention.

As discussed above, a person of ordinary skill in the art reading the original written description would understand that the "revolution speed" is a revolution speed of the driving motor, i.e. an engine revolution speed or a motor revolution speed. The specification expressly refers to "the speed of the driving motor" at page 2 line 14. The further written description (e.g. page 2 line 30 to page 3 line 4, page 4 lines 10 to 18, and page 6 lines 28 to 31) would also be clearly understood by a person of ordinary skill to refer to the engine revolution speed or motor revolution speed. For example, the diagrams of present Figs. 1 and 2 are the same type of gear ratio diagram as shown in Figs. 5, 6, 7 and 8 of the Nobumoto reference (US Patent 5,947,861). A person of ordinary skill clearly

understands that such a diagram shows the engine revolution speed (n) on the vertical axis and the vehicle driving speed (v) on the horizontal axis. Thus, amending the specification simply to state what was clearly evident as an inherently understood feature of the original disclosure does not introduce new matter. Moreover, a person of ordinary skill in the art reading the original description would have readily understood that the pertinent revolution speed is the engine or motor revolution speed, and that this pertains to the invention invented by the inventors and disclosed in the application.

Regarding the "linear transmission ratio", this phrase has been avoided. Instead, the claims now recite a "virtual transmission ratio" (expressly disclosed in the specification at page 9 lines 1 to 2), in which the motor revolution speed and the vehicle velocity vary along a characteristic line (clearly and expressly disclosed in the specification at page 4 line 25 and in Fig. 2) that does not pass through a zero point of the motor revolution speed and the vehicle velocity (clearly disclosed in the specification at page 9 lines 2 to 4 and Fig. 2). Furthermore, the linear equation is a readily known standard mathematical equation defining a "characteristic line", so that a person of ordinary skill in the art would also have understood that the inventors had possession of this claimed feature of the invention.

Regarding claim 21 lines 10 to 12, the previous phrase "revolution speed and a vehicle velocity ... are not directly proportional to one another" has been deleted as unnecessary for properly and fully defining the inventive subject matter.

The Examiner's assertion that the original disclosure does not provide for "seven steps" of the transmission ratio shifting is respectfully traversed. Actually, the original written description at page 4 line 33 and original claim 6 (forming part of the original disclosure) expressly disclose seven shifting steps.

For the above reasons, a person of ordinary skill in the art reading the original disclosure would have readily understood that the inventors had possession of the presently claimed inventive subject matter. The Examiner is respectfully requested to withdraw the rejection under 37 USC 112(1).

- 9) Referring to page 6 of the Office Action, the rejection of claims 29 and 32 to 34 as indefinite under 35 USC 112(2) has been addressed in the present amendment, and is respectfully traversed.

Regarding claim 29, the previously recited "manner" of driving the motor vehicle has now been clarified by reciting particular parameters that can influence the activation of the acceleration mode.

The Examiner points out that claims 32 and 34 involve adjusting the transmission ratio, and further asserts "*the original disclosure states that a revolution speed altering achieves the result. Therefore, it is unclear how claims 32 and 34 relate to the original disclosure*". The Examiner's assertion is respectfully traversed, because of a too-limited and incomplete statement of the original disclosure. It is true that

the original disclosure and original claim 1 (as well as present claim 21) refer to increasing the motor revolution speed. However, additionally, the original disclosure, original claim 1, and present claim 21 also expressly refer to an infinitely-variable transmission ratio, by which the motor revolution speed can be increased or reduced in steps. Furthermore, the original disclosure clearly explains that the change of the motor revolution speed is achieved with shifting steps of the infinitely-variable transmission ratio or gear ratio (see page 3 line 1 to page 4 line 35). It is further clearly understood that any stepped change of the revolution speed necessarily also involves a stepped change of the transmission ratio or gear ratio, which is accordingly varied in an infinitely-variable manner. For example see page 8 lines 1 to 16 and page 9 lines 1 to 16, describing Fig. 2, which clearly shows the distinct ranges 13, 15, 17, etc. of the different gear or transmission ratios. Thus, while the invention involves changing the motor revolution speed (n) plotted along the vertical axis of Fig. 2, the several discontinuous line segments shown in Fig. 2 clearly also demonstrate changing the gear ratios or transmission ratios. Thus, claims 32 and 34 clearly and directly relate to the original disclosure, without any indefiniteness.

For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 29 and 32 to 34 as indefinite under 35 USC 112(2).



- 10) Referring to pages 6 to 9 of the Office Action, the rejection of claims 21 to 31 and 34 as anticipated by US Patent 5,947,861 (Nobumoto) is respectfully traversed.

Independent claim 21 as currently amended recites that the automatic gearbox has an acceleration mode in which the motor revolution speed is increasable in plural discontinuous speed range shifting steps with motor revolution speed jumps therebetween. In a plurality of such steps, the motor revolution speed is increasable respectively with a virtual transmission ratio in which the motor revolution speed and the vehicle velocity vary along a characteristic line that does not pass through a zero point of the motor revolution speed and the vehicle velocity.

As explained in the specification (for example see page 9 lines 1 to 4) and shown in Fig. 2, the virtual transmission ratio "feels like" an actual physical stepped gearbox in its behavior, because the motor revolution speed and the vehicle velocity vary along a characteristic line in each of plural discontinuous speed range shifting steps with motor revolution speed jumps therebetween. In other words, when shifting from one "gear" to another "gear", the motor speed first jumps to the new range, and then there is a linear relationship between the motor speed and the vehicle velocity. An actual physical transmission ratio of an actual physical stepped gearbox also has the motor revolution speed and the vehicle velocity varying along a characteristic line. Thus, the driver of the vehicle perceives a linear relationship between the motor speed and the vehicle speed in

both the present inventive infinitely variable gearbox and the conventional mechanical stepped gearbox.

However, in the physical mechanical stepped gearbox, that characteristic line or linear relationship necessarily passes through a zero point of the motor revolution speed and the vehicle velocity because of the fixed interaction of the input and output gear wheels of the gearbox. For example, if the mechanical gearbox is switched to a particular selected gear (i.e. a particular gear ratio), and the motor is operated slower and slower all the way down to zero rpm, then the vehicle speed would correspondingly become slower and slower all the way down to zero mph. The mechanical gears provide a fixed constant gear ratio.

On the other hand, in the present inventive automatic gearbox with an infinitely-variable transmission ratio, the transmission ratio in a selected gear range varies along a characteristic line (i.e. is a linear characteristic), but this line does NOT pass through the zero point of the motor revolution speed and the vehicle velocity. Thus, while the motor revolution speed varies linearly relative to the vehicle velocity (or vice versa), the gear ratio is not fixed or constant (which would cause the characteristic line to pass through the zero point), but rather the transmission ratio actually varies or changes along the characteristic line. Considered mathematically, a constant fixed transmission ratio would extend along a line passing through the zero point as defined by the equation  $n = mv$  wherein  $n$  is the motor revolution speed,  $v$  is the vehicle speed, and  $m$  is the slope of the characteristic line defining the fixed transmission ratio. On the other hand, when the characteristic

line does not pass through the zero point, there is instead an apparent virtual non-zero offset value (b) of the engine speed (n) at which the characteristic line crosses the vertical axis for zero vehicle speed (v). The transmission ratio along any line segment representing a gear range (e.g. the gear range 15 in Fig. 2) varies in consideration of both m and b, as well as v or n.

The above features significantly distinguish the present invention from all previous transmissions including mechanical stepped transmissions as well as infinitely-variable transmissions with stepped fixed transmissions ratios. The infinitely or continuously variable transmission of Nobumoto is such a transmission that can be operated in a step-wise control mode with a stepped transmission ratio that is a fixed constant transmission ratio in each stepped gear range, and in a continuous control mode that causes a continuous and gradual change in engine speed (N) as the vehicle speed (V) increases (see abstract and col. 4 lines 55 to 66).

Particularly, Nobumoto discloses two distinct control zones or modes, namely a step-wise control zone Z1 in which the gear ratio changes in a step-wise manner, and a continuous control zone Z2 in which the gear ratio changes so as to cause a continuous and gradual change in the engine speed N as the vehicle speed V increases (col. 1 line 64 to. col. 2 line 12 and col. 4 lines 52 to 67). The transmission according to Nobumoto purposely and necessarily switches between, and operates with either one or the other control mode, namely either the step-wise control zone Z1 or the continuous control zone Z2, depending on

the driving conditions and various control parameters (col. 2 lines 6 to 47).

As shown in Figs. 5, 6 and 7 of Nobumoto, the step-wise control zone Z1 involves a succession of shifting steps with motor speed jumps therebetween, whereby each one of these shifting steps has the motor speed and vehicle velocity varying along a characteristic line. But the characteristic lines of the shifting steps are shown as expressly passing through the zero point or origin of the graph of engine speed  $N$  versus vehicle speed  $V$ . Thus, the step-wise control zone or mode Z1 of Nobumoto involves shifting steps with a fixed constant transmission ratio similar to that of a mechanical stepped transmission.

On the other hand, the continuous control mode Z2 of Nobumoto involves controlling the engine speed to increase approximately linearly with an increase in the vehicle speed, so as to cause a continuous and gradual change in engine speed  $N$  as the vehicle speed  $V$  increases (see abstract, col. 4 lines 60 to 63). Thus, the continuous control mode Z2 does NOT involve a stepped change of the motor revolution speed in plural discontinuous speed range shifting steps with motor speed jumps therebetween. That is directly contrary to the goal or aim of the continuous control mode. Namely, the continuous control mode Z2 is purposely to achieve a continuous and gradual change in engine speed as the vehicle speed increases (col. 4 lines 60 to 63).

Summarizing the above, the step-wise control zone Z1 does not include or suggest the inventive feature that the linear

characteristic thereof shall not pass through the zero point or origin of the motor speed and the vehicle speed, and the continuous control zone Z2 does not involve plural discontinuous speed range shifting steps with motor speed jumps therebetween. Nobumoto purposely provides these two distinct control modes with different features, and selects one or the other control mode depending on the driving conditions, because the stepped mode is suitable for some driving conditions while the continuous mode is suitable for other driving conditions (see col. 2 lines 6 to 44, col. 4 line 46 to col. 5 line 23). Therefore, Nobumoto teaches away from the present invention, in which a control mode is provided in which the motor speed is increased in plural discontinuous speed range shifting steps with motor speed jumps therebetween, and in plural such steps the motor speed is increased with a virtual transmission ratio in which the motor speed and the vehicle speed vary along a characteristic line that does not pass through the zero point.

The dependent claims are patentably distinguishable over the prior art already due to their dependence. Moreover, the dependent claims recite additional features that further distinguish the invention from the prior art, for example as follows. Present claim 26 recites that respective separate ones of the shifting steps are respectively specified for increasing the motor speed and for reducing the motor speed. In other words, different shifting steps are used while reducing the motor speed, relative to the shifting steps that are used for increasing the motor speed. This does not seem to be disclosed by Nobumoto.

Currently amended independent claim 34 is directed to an improvement in a motor vehicle with a continuously variable transmission and a transmission controller including a memory storing a control program. According to the inventive improvement in the control program, the transmission ratio is adjusted in plural discrete discontinuous steps with discontinuous jumps of the motor rotational speed between successive transmission ratio ranges respectively having a respective virtual transmission ratio of the motor rotational speed relative to the vehicle speed. In this virtual transmission ratio of the respective selected transmission ratio range, the motor rotational speed and the vehicle speed vary along a respective characteristic line defined as  $n = mv + b$ , wherein  $n$  is the motor rotational speed,  $v$  is the vehicle speed,  $m$  is a slope of the characteristic line, and  $b$  is an apparent virtual non-zero offset value of the motor rotational speed for a zero value of the vehicle speed along the characteristic line. Essentially, this is a mathematical definition of the characteristic line along which the motor rotational speed and the vehicle speed vary in a respective one of the plural discrete discontinuous steps of the transmission ratio. Thus, claim 34 is directed to a similar feature as claim 21, but claim 34 defines the respective characteristic line with a mathematical equation rather than a verbal description.

For the same reasons as discussed above, Nobumoto does not disclose such features of claim 34. Particularly, Nobumoto does not disclose an operating or control mode with plural discrete discontinuous steps of the transmission ratio with discontinuous

jumps of the motor rotational speed between successive transmission ratio ranges respectively having a respective virtual transmission ratio in which the motor speed and the vehicle speed vary along a respective characteristic line defined as  $n = mv + b$  wherein  $b$  is an apparent virtual non-zero offset value of the motor speed for a zero value of the vehicle speed along this characteristic line. While Nobumoto discloses a step-wise control mode Z1 that has plural discrete discontinuous steps of the transmission ratio with discontinuous jumps of the motor rotational speed between successive transmission ratio ranges, each of those transmission ratios extends along a characteristic line that passes through the zero point, i.e. is defined by an equation  $n = mv$  (wherein there is no offset  $b$ , or  $b = 0$ ). The gear ratio graphs in Figs. 5, 6 and 7 all show the characteristic lines extending through the zero point or origin with no offset of the engine speed away from zero. Thus, the transmission ratios of the stepped control mode of Nobumoto are just like a mechanical stepped gear transmission having a fixed constant gear ratio in each transmission gear range. On the other hand, Nobumoto discloses a continuous control mode Z2 in which the engine speed is controlled to increase approximately linearly with an increase in the vehicle speed, but without a succession of plural discrete discontinuous steps of the transmission ratio with discontinuous jumps of the motor rotational speed between the successive transmission ratio ranges. To the contrary, the continuous control mode purposely aims to achieve a continuous and gradual change in engine speed as the vehicle speed increases without shifting steps so as to

avoid unstable driving conditions (col. 4 lines 60 to 63, col. 1 lines 50 to 55, col. 2 lines 6 to 12). Thus, Nobumoto does not disclose the above mentioned features of present independent claim 34.

Furthermore, such features would not have been suggested or obvious, because Nobumoto expressly and purposely distinguishes between a step-wise control mode that has successive discontinuous steps of the transmission ratio along respective characteristic lines that have no offset (b) from the zero point, and a continuous control mode that purposely does not have plural discrete discontinuous steps of the transmission ratio with discontinuous jumps of the motor speed therebetween but rather provides a gradual, continuous increase of the motor speed.

For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 21 to 31 and 34 as anticipated by Nobumoto.

- 11) Referring to pages 9 to 12 of the Office Action, the rejection of claims 32 and 33 as obvious over Nobumoto in view of US Patent 4,704,683 (Osanai) is respectfully traversed.

Currently amended independent claim 32 is directed to a continuously variable transmission for a motor vehicle, with a control device and a control program whereby the transmission ratio is adjusted in plural discrete discontinuous steps with discontinuous jumps of the motor speed between successive transmission ratio ranges respectively having a respective virtual transmission ratio of the motor speed relative to the vehicle speed. In the respective virtual transmission ratio, the



motor rotational speed and the vehicle speed vary along a respective characteristic line that does not pass through a zero point of the motor speed and the vehicle speed. Thus, claim 32 recites features similar to independent claim 21, which has been discussed above in comparison to Nobumoto. The same above discussion is reasserted here by reference, now with respect to claim 32.

The Examiner has acknowledged that Nobumoto does not disclose the transmission having adjustable primary and secondary cone pulleys as recited in prior claim 32. In this regard, the Examiner cited Osanai for disclosing a transmission with such adjustable cone pulleys. However, claim 32 has been amended to more generally recite --an adjustable drive element-- and --an adjustable driven element-- instead of the adjustable cone pulleys. The particular construction of the variator arrangement of the transmission is not a significant feature or limitation of the present invention. Namely, the patentability of claim 32 does not rely on the particular construction of the variator having adjustable cone pulleys. Thus, the variator arrangement of Nobumoto is also pertinent.

As discussed above, it is the transmission shift control that patentably distinguishes the invention of claim 32 over the prior art. Even if the teachings of Osanai are considered in combination with those of Nobumoto as discussed above, the present invention would not have been suggested. In the continuously variable transmission according to Osanai, the speed ratio or transmission ratio ( $e$ ), being the ratio of the output rotational speed relative to the input rotational speed of the

transmission, is related to the ratio of the motor rotational speed to the vehicle driving speed. According to Osanai, this speed ratio (e) is held constant in each one of successive shift ranges, for example as shown by the "speed ratio" (e) as plotted over time in Fig. 1 of Osanai. Namely, it can be seen that the speed ratio is shifted in successive steps, but in each step, the speed ratio remains constant over time. That corresponds to the step-wise shift control according to Nobumoto, in which each shift step uses a respective constant transmission ratio along a characteristic line that passes through the zero point or origin of the graph of engine speed relative to vehicle speed. Such a constant transmission ratio, when graphed relative to time on the horizontal axis, will show a straight horizontal line, because the transmission ratio remains constant over time within the respective shifting step.

Thus, a person of ordinary skill in the art considering the teachings of Osanai together with Nobumoto would not have been led any closer toward the present invention. Instead, the teachings of Nobumoto would have been reinforced, namely that a step-wise control mode should use successive gear ratio steps along characteristic lines that expressly and purposely pass through the zero point of motor rotational speed and vehicle speed in order to achieve a constant gear ratio during each shifting step.

For the above reasons, the Examiner is respectfully requested to withdraw the obviousness rejection of claim 32.

12) Regarding the third paragraph on page 12 of the Office Action, applicant respectfully traverses the Examiner's assertion that "Applicant's Fig. 2 does not appear to show this feature. Fig. 2 appears to show the extended line portions passing through the origin". The specification expressly discloses that the extension of the respective characteristic line of a given virtual transmission ratio does not pass through the zero point (page 9 lines 1 to 4). Furthermore, by carefully laying a ruler or straightedge along the line segments in Fig. 2, it can be seen that the linear extensions of these line segments (for at least some if not all of the line segments) do not extend through the origin. For example, for the line segments 1 and 6, this is extremely clear. Furthermore, it is also quite clear for the line segment 15, and for the three unnumbered line segments between the line segment 17 and the line segment 6. This can be confirmed in an objective manner by completely blocking the origin point and the vertical axis from view, and then laying a straightedge along the respective line segment and drawing the extension line toward the lower left (without having the origin visible as a reference point), and thereafter exposing the origin to see where the line extensions cross the vertical axis. It will be seen that at least some or all of the line extensions have a non-zero offset along the vertical axis. The line extension of the line segment 13 comes close to the origin, but even that line extension has a small offset. When this graphical depiction of Fig. 2 is understood in connection with the written description (as it must, because Fig. 2 is not stated to be drawn to scale), a person of ordinary skill in the art would understand

Fig. 2 to depict exactly what is described in the specification, namely that the linear extensions of the line segments do not pass through the zero point.

- 13) Favorable reconsideration and allowance of the application, including all present claims 21 to 34, are respectfully requested.

Respectfully submitted,

WFF:he/4954  
Enclosures:  
Transmittal Cover Sheet  
Request for Continued Examination  
Form PTO-2038  
Drawing Transmittal  
w. 1 New Sheet of drawing  
Postcard

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CERTIFICATE OF MAILING:

I hereby certify that this correspondence with all indicated enclosures is being deposited with the U. S. Postal Service with sufficient postage as first-class mail, in an envelope addressed to: COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450 on the date indicated below.

Walter F. Fasse 6/12/09  
Name: Walter F. Fasse - Date: June 12, 2009